

# Historical Preservation

## Benefits of Our Systems

1. Systems continuously monitor critical parameters.
2. Hundreds of sensors can be monitored by one datalogger.
3. Data are recorded over time, providing a record of conditions.
4. Sensors monitor temperature, relative humidity, carbon dioxide, solar radiation, and other factors that can affect artifacts.
5. Monitoring and control can be based on time or measured parameters, or a series of events.
6. Systems can initiate shut-downs, sound alarms, and report conditions by calling out to pagers, radios, or phones. Our voice-synthesized modems can speak to you.
7. Systems have their own power supply. They can recognize and report ac power loss while continuing to measure and store data.
8. Systems support hardwire or wireless communication to a central computer, making real-time data analysis and display easy.

[www.campbellsci.com/historical-preservation](http://www.campbellsci.com/historical-preservation)



*A weather station provides environmental data needed for the restoration and preservation of the Sphinx. Continuous monitoring of meteorological parameters provides crucial information for managing and preserving outdoor sites.*

Campbell Scientific measurement and control systems aid in the preservation and management of historical sites and artifacts by monitoring and recording the parameters that affect deterioration. Our systems are versatile and can be configured to monitor a variety of parameters at both outdoor and indoor sites. Museums, libraries, archives, monuments, and historical sites use our products.

At indoor sites, such as museums, our systems can monitor relative humidity, temperature, light, CO<sub>2</sub>, particulate matter, and many other parameters. Data can be transmitted to a central computer for real-time display or archival and analysis. Automated control based on the measured parameters is also possible. For example, if temperature levels are outside a preset range, the system can activate or shut down HVAC equipment. Alarms can also be triggered or phone numbers dialed to alert key personnel. Our voice-synthesized phone modems can even call and verbally inform you if a problem is detected.

At outdoor sites, weather stations provide valuable meteorological data on relative humidity, wind speed and direction, temperature, solar radiation, precipitation, and other weather conditions. Parameters influencing structural integrity such as crack size, tilt, vibration, and soil moisture can also be monitored. Indoor and outdoor systems at the same site can be networked.



*The CR10X is a versatile, rugged datalogger capable of long-term, unattended operation.*

## Monitoring and Control

Our systems are based around battery-powered, programmable dataloggers (measurement and control units) that measure the sensors, then process, store, and transmit the data. Each datalogger has multiple channel types, allowing nearly all sensor types to be measured by a single unit. For example, light, air temperature, and relative humidity sensors can all be measured simultaneously by the same datalogger. Using multiplexers, one datalogger can measure hundreds of sensors. Multiple dataloggers at a site can be networked and transmit data to a single central computer for display, analysis, or archive.



*A preservation project at Castillo de San Marcos, St. Augustine, FL involves monitoring cracks in three dimensions, the tilt of the large segments between the major cracks, change of soil moisture within the bastion, and weather conditions at the site.*

Statistical and mathematical functions are built into our dataloggers, allowing data reduction at the measurement site. For example, if temperature measurements are taken in 10 minute intervals, the datalogger can process the data and output hourly averages with maximum and minimum temperatures. This provides the needed information in fewer numbers, simplifying the data analysis or review process. Measurements can be recorded for historical analysis and displayed in real-time in the desired units of measure (e.g., °F, °C, °K, etc.).

Because our dataloggers are programmable, they are capable of performing responsive measurement and control sequences. Powerful on-board instruction sets allow unattended measurement and control decisions based on time or conditional events. This includes activating or shutting down equipment, sounding alarms, or calling out to phones or pagers. Our systems can perform functions based on multiple conditions or events, such as deciding to increase or decrease air exchange based on time of day, outside temperature, and/or inside temperature.

The reliability of our control units ensures collection of time-stamped data, even under adverse circumstances. Because they have their own power supply (alkaline or rechargeable batteries), the dataloggers continue to measure and record existing conditions during power outages. Time-stamped data provides valuable information for identifying and verifying past events.

## Sensors

We manufacture many sensors and offer a wide variety made by other manufacturers. Since our dataloggers are compatible with most available sensors, you have the flexibility to customize a monitoring system to your site.

## Communications

Systems can be monitored and controlled by an on-site or remote computer. Communications options for transmitting data and/or reporting conditions of remote sites include: radio, telephone, cellphone, voice-synthesized phone, and satellite. Options likely to be used at sites near the central computer include ethernet and coaxial cable. Options in a network can be mixed. If you want, you can even automate the process of putting your data on the Internet.